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PROCEEDINGS
OF THE
AMERICAN PHILOSOPHICAL SOCIETY.

VOL. I.

JULY & AUGUST, 1838.

No. 3.

Stated Meeting, July 20.

Present, thirteen members.

Mr. DU PONCEAU, President, in the Chair.

The following donations were received:—

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Memorias da Academia R. das Sciencias de Lisboa. Tomo XII.
Parte I. Lisbon, 1837.—*From the Academy.*

Roteiro geral dos Mares, Costas, Ilhas, &c. Por Antonio Lopes da
Costa Almeida. Tomo I. Parte III. Lisbon, 1837.—*From the
same.*

Compendio de Botanica do Doutor Felix de Avellar Brotero. Tomo I.
Lisbon, 1837.—*From the same.*

Principios geraes de Castrametação, applicados ao Acampamento
das Tropas Portuguezas. Por F. J. Barreiros. Lisbon, 1838.—
From the same.

Manual de Instruções praticas sobre a Sementeira, Cultura e Corte
dos Pinheiros, &c. Por F. L. G. de Varnhagen. Lisbon, 1836.—
From the same.

Glossario de Vocabulos Portuguezes derivados das Linguas Orientaes
e Africanas, excepto a Arabe. Por D. F. de S. Luiz. Lisbon,
1837.—*From the same.*

Ensaio sobre os Principios geraes de Strategia, e de Grande Tactica.
Por F. J. Barreiros. Lisbon, 1837.—*From the same.*

Collecção de Noticias para a Historia e Geografia das Nações Ultra-
marinas, que vivem nos Dominios Portuguezes. Tomo V. Lis-
bon, 1836.—*From the same.*

Mémoires de l'Academie Royale des Sciences Morales et Politiques de l'Institut de France. Tome I. Deuxième Série. Paris, 1837.—*From the French Institute and Academy.*

North American Herpetology. By J. E. Holbrook, M. D. Philadelphia, 1836.—*From the Author.*

Atlas Classica. By H. S. Tanner. No. 8. Philadelphia, 1838.—*From the Author.*

Illustrations of the Atmospheric Origin of Epidemic Diseases. By T. Forster. Chelmsford, 1829.—*From the Author.*

Medicina Simplex; or the Pilgrims Waybook. By T. Forster. London, 1832.—*From the Author.*

Observations sur l'Influence des Comètes sur les Phénomènes de l'Atmosphère. Addressés a M. Arago. Par T. Forster. Aix-la-Chapelle, 1836.—*From the Author.*

Recueil de ma Vie, mes Ouvrages et mes Pensées. Opuscule Philosophique. Par T. Forster. Brussels, 1837.—*From the Author.*

The Credit System of France, Great Britain, and the United States. By H. C. Carey. Philadelphia, 1838.—*From the Author.*

Darlegung des Verfahrens der Preussischen Regierung gegen den Erzbischof von Cöln. Berlin, 1837.—*From the Berlin Academy.*

Beilagen zu der Darlegung des Verfahrens der Preussischen Regierung gegen den Erzbischof von Cöln. Berlin, 1837.—*From the same.*

Ueber die Berechnung der Sonnenfinsternisse, von C. Rümker. Hamburg, 1837.—*From President A. D. Bache.*

Förenta Staterna och Canada, Aren 1832, 1833 och 1834, af C. D. Arfwedson. Two Vols. Stockholm, 1835.—*From the Author.*

Scener i Nord-Amerika, af C. D. Arfwedson. Stockholm, 1836.—*From the Author.*

Minnen från Europa och Amerika, af C. D. Arfwedson. Stockholm, 1837.—*From the Author.*

The Transylvania Journal of Medicine. Vol. XI. No. I. For January, February, and March. Lexington, Ky., 1838.—*From the Editors.*

Periodical Collection, published by the Imperial Academy of St. Petersburg. Four Vols. (In Russian.) St. Petersburg, 1829-32.—*From the Academy, transmitted by Mr. P. von Goetze through the Russian Minister.*

Memoirs of the Russian Academy. Twelve Vols. (In Russian.) St. Petersburg, 1815 to 1828.—*From the same.*

Continuation of the Memoirs of the Russian Academy. Three Vols. (In Russian.) St. Petersburg, 1834-5.—*From the same.*

Works and Translations, published by the Russian Academy. Seven Vols. (In Russian.) St. Petersburg, 1805 to 1823.—*From the same.*

Dictionary of the Russian Academy. Six Vols. (In Russian.) St. Petersburg, 1806 to 1822.—*From the same.*

Complete Works of Admiral Schischkoff, President of the Academy. Sixteen Vols. (In Russian.) St. Petersburg, 1818 to 1834.—*From the same.*

On the Affinity of the Russian and Greek Languages. Three Vols. (In Russian.) St. Petersburg, 1828.—*From the same.*

Recherches sur les Racines des Idiomes Slavons. Par l'Amiral Chichekof. Traduit du Russe. Part I. St. Petersburg, 1832.—*From the same.*

Relation of the Maritime War between Russia and Sweden, in the years 1788, 89, & 90. By Admiral Schischkoff. (In Russian.) St. Petersburg, 1826.—*From the same.*

Popular Songs of the Greeks. (In Russian.) St. Petersburg, 1825.—*From the same.*

Memoirs of Admiral Schischkoff for the year 1812. (In Russian.) St. Petersburg, 1831.—*From the same.*

A brief and true Relation of Napoleon. (In Russian.) St. Petersburg, 1814.—*From the same.*

Proceedings of the Russian Academy at their Sitting, January 18th, 1836, for the Reception of the Prince of Oldenburg as an Honorary Member. (In Russian.) St. Petersburg, 1836.—*From the same.*

Untersuchungen über die Sprache, mitgetheilt in den Nachrichten der Russischen Akademie, von Alexander Schischkow. Aus dem Russischen übersetzt von P. von Goetze. Three Vols. St. Petersburg, 1826-7 & 1837.—*From the same.*

Serbische Volkslieder, in's Deutsche übertragen von P. von Goetze. St. Petersburg, 1827.—*From the Translator.*

Stimmen des Russischen Volks in Liedern. Gesammelt und übersetzt von P. von Goetze. Stuttgart, 1828.—*From the Translator.*

Reports of the Trustees of the Philadelphia Gas Works. Philadelphia, 1838.—*From the Trustees.*

Observations Météorologiques et Magnétiques, faites dans l'Empire de Russie, redigées et publiées par A. T. Kupffer. No. 1. St. Petersburg, 1837.—*From the Russian Academy.*

Plaza Universal de Todas Ciencias, y Artes. Por el Doctor C. Suarez de Figueroa. Perpignan, 1630.—*From Mr. E. C. Wines.*

Weekly Register. Edited by William O. Niles. Vol. LII.—*From the Editor.*

Necrological Notice of Dr. Philip Syng Physick; delivered before the American Philosophical Society, May 4, 1838. By W. E. Horner, M. D. Philadelphia, 1838.—*From the Author.*

Mr. Kane, from the Secretaries, reported that they had chosen Dr. Franklin Bache to be the Reporter of the Society.

The Committee, appointed on the Communication of Dr. John Locke, of Cincinnati, read at the last meeting, made the following Report, which was adopted.

“The Committee to whom was referred the Communication of Professor John Locke, of Cincinnati, report that it gives the details of a series of experiments, made for the purpose of determining the magnetic intensity and dip for certain positions in Ohio. For these experiments he had furnished himself, in London, with the best apparatus, and had vibrated there two needles of the form recommended by Hansteen, and one in the form of a small flat bar. Five months afterwards, namely on the 17th of January, 1838, he again vibrated these needles at Cincinnati, and found the ratio of horizontal intensity at the former place to that at the latter, as follows: by needle No. 1, as 1 to 1.1624; by needle No. 2, as 1 to 1.1639; by No. 3, as 1 to 1.2037. Of these results, the author prefers the last; inasmuch as the magnetism of needles is liable to decrease, but not to increase.

“On the 20th of August, 1837, he made experiments with his dipping needle, to determine the dip at Westbourn Green, near London, the mean of which gives $69^{\circ} 23'.3$.

“On the 26th of Nov. 1837, the mean of a series of experiments made at Cincinnati, in lat. $39^{\circ} 6'$ N., and long. $84^{\circ} 27'$ W., gave the dip = $70^{\circ} 45'.75$.

“At Dayton, Ohio, in lat. $39^{\circ} 44'$ N., and long. $84^{\circ} 11'$ W., the dip was found to be $71^{\circ} 22'.75$. on the 26th of March, 1838.

“At Springfield, Ohio, in lat. $39^{\circ} 53'$ N., and long. $83^{\circ} 46'$ W., the dip was found, on the 29th of March, 1838, to be $71^{\circ} 27'.375$.

“At Urbana, lat. $40^{\circ} 03'$ N., long. $83^{\circ} 44'$ W., March 30, 1838, the dip was found = $71^{\circ} 29'.94$.

“At Columbus, the seat of government of Ohio, lat. $39^{\circ} 57'$ N., long. $83^{\circ} W.$, April 3d, 1838, the dip was found = $71^{\circ} 04'.875$.

“The interest of this paper is much increased by the circumstance that no accurate experiments on the intensity and dip of the needle have heretofore been made in the United States, west of the Alleghany mountains.

“The Committee conclude their Report by recommending that Professor Locke’s Communication be printed in the Society’s Transactions.”

“PETER S. DU PONCEAU,
R. M. PATTERSON,
J. SAXTON.”

Dr. Patterson laid before the Society, copies of a Memorial presented to Congress by Dr. Henry Hall Sherwood, and of a Report thereon by the Committee on Naval Affairs of the Senate, in which are set forth Dr. Sherwood’s “claims to have made new and important discoveries in magnetism generally, and more particularly in the magnetism of the earth; and to be the inventor of an instrument called the geometer, whereby, without the aid of the quadrant or sextant, or chronometer, and without taking a celestial observation, it is practicable and easy, at sea and on land, and in all weathers, to determine, merely by the dip of the needle, the variation of the needle, and the latitude and longitude of any place on the surface of the globe.”

Dr. Patterson called the attention of the Society to some further extracts from the Report of the Naval Committee, in which it is stated that from the opinions obtained from scientific men, “as well as from their own examination, they are fully persuaded that the discoveries and invention of Dr. Sherwood are entitled to the most serious consideration of the public, and to the encouragement and patronage of Congress;” that they “regard them as highly interesting and important to the navigation and commerce of the United States, and as bidding fair to open a new era in the history of the science of magnetism.” Of this Report 5000 additional copies were ordered to be printed by Congress.

Dr. Patterson remarked that the imposing circumstances under which Dr. Sherwood’s extraordinary claims were brought forward, might make a brief review of them worthy of the Society’s attention.

1. The first of Dr. Sherwood’s asserted discoveries is the

communication of magnetism to a steel plate or ring, which he supposes others had failed to do. Dr. Patterson observed that, on the contrary, nothing is better known in experimental science than that magnetic polarity can be given to steel in any form, and with as many poles as the operator pleases. In illustration of this remark, he exhibited to the Society a steel plate, prepared some years ago by Mr. Saxton, who was then in London, according to an experiment first made by Chladni, on which polar lines were traced, so as to mark on one side the word '*magnet*,' and on the other the date '*24th of February, 1836*,' the position of the lines being made apparent by strewing steel filings over the plate.

2. Dr. Sherwood asserts that, if a steel ring, marked in two opposite points, have magnetism communicated to it by passing it over a magnet from one of those points to the other, in a way which he describes, the magnetic poles will be found to reside, not in the marked points which he styles the poles of the ring, but in other points distant from them $23^{\circ} 28'$, thus exhibiting a correspondence with the obliquity of the ecliptic. On this fact he founds his theory of the magnetism of the earth. Dr. Patterson mentioned that Mr. Saxton and himself had carefully repeated this experiment, and had found, without surprise, that the assertion of Dr. Sherwood was entirely erroneous. When the magnetism was communicated in the awkward manner used by Dr. Sherwood, the poles were not indeed at the points of the first and last contact of the magnet; but the deviation was irregular, was different at the different poles, and bore no relation to the obliquity of the ecliptic. When the magnetism was communicated to the ring by carefully setting two opposite points on the poles of a horse-shoe magnet, the *magnetic* poles of the ring coincided exactly with those points. This fact was shown in an experiment made before the society.

3. As to the hypothetical deductions of Dr. Sherwood, "that the magnetic poles of the earth are $23^{\circ} 28'$ from its poles, and of course within the polar circles," "that the magnetic and polar axes cross each other at the same angle of $23^{\circ} 28'$," "that the magnetic and terrestrial meridians of every place cross each other at angles dependent on the angles of the two

axes," and "that the line of no variation is a great circle of the earth, and is that magnetic meridian which, after cutting the magnetic pole, passes at the distance of $6^{\circ} 28'$ from the pole of the earth,"—Dr. Patterson remarked that these notions were directly contradicted by well observed facts, that there are more than two magnetic poles, that the magnetic poles are not in the polar circles, that there are several lines of no variation, and that those lines are not great circles, but are altogether irregular in their course.

4. The practical applications of Dr. Sherwood's theory are announced in these terms: "With the correct dip given him, observed at a given time, he works out either or all of the following results: the variation of the needle, the distance of the circle of no variation from the place, and its angle with the meridian, and the latitude and the longitude. With the variation given him, in the same manner, he determines the dip and the other results. He must know, however, if the dip be given, whether the place of observation is east or west of the circle of no variation; and if the variation be given, whether it is north or south of the magnetic equator, and near the arctic or antarctic semicircle of no variation."

It is sufficient to remark, said Dr. Patterson, on this train of assertions, that they necessarily assume the truth, within the limits which are stated, of two positions; 1st, that the same dip will always correspond with the same variation, and 2d, that every place on the earth's surface has a different dip from all others,—both of which are notoriously untrue. The various examples, contained in the Report, of calculations made from the single datum of the dip or the variation, and which give for results all the other particulars with an accuracy extending not to seconds merely, but to thirds, must be regarded as illusory.

Mr. Walker also made a verbal communication on the subject of Dr. Sherwood's alleged discoveries. He remarked that even admitting the correctness of the Doctor's hypothesis, as stated in his Memorial to Congress, still his method would be of no use for nautical or geographical purposes, for the following reasons:—

1. The apparatus for determining the dip and variation of

the compass is more costly than a common sextant and mercurial horizon.

2. The observations of the dip and variation of the compass are more difficult to be made with accuracy than a common lunar observation.

3. The reduction of these magnetic observations, on the Doctor's hypothesis, would be more laborious than the working of a lunar observation.

4. Mr. Walker proceeded to show, in conformity with the remarks of Dr. Patterson, that Dr. Sherwood's assertion that he can determine the latitude and longitude from the dip alone, or from the variation alone, was contrary to the first principles of the geometry of position; since a point, in order to be determined in space, must be referred to three given surfaces. If one of them is the surface of the spheroid as in geography, then the point must be referred to two other given surfaces; whereas, by the dip alone, or the variation of the compass alone, a point can only be referred to one of these two surfaces, and the resulting locus is a line and not a point. Hence, if latitude and longitude are determined by magnetic observations, it must be by both the dip and variation. Dr. Sherwood's method, therefore, could be of no use for *nautical purposes*, from the impossibility of observing the variation of the compass at sea with any tolerable degree of accuracy.

5. Dr. Sherwood's assertion that the magnetic method could be used in cloudy weather is inaccurate; since the variation of the compass cannot be ascertained without astronomical observations.

6. Restricting then the use of magnetic observations to those made on land in fair weather, still, owing to local perturbations, the probable discrepancy of the mean of many observations at one place from the theoretic dip and variation, may, at a low estimate, be assumed to be ten minutes of space, and, as the resulting errors of *latitude* are of the same order, we should have ten miles for its probable error, which is *twenty times* that of a common sextant and mercurial horizon.

7. Owing to the proximity of the north pole to Dr. Sherwood's assumed magnetic pole, the probable error in the resulting *longitude* would far exceed that of the dip and variation